RENEWABLE ENERGY PROGRAM

CALIFORNIA ENERGY COMMISSION

CONSUMER EDUCATION MARKETING ANALYSIS: Emerging Renewable Technologies

CONSULTANT REPORT

OCTOBER 2000
P500-00-020

Gray Davis, *Governor*

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FINAL REPORT

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October 2, 2000

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Introduction

The California Energy Commission encourages the use of on-site electricity generation via four emerging renewable technologies – photovoltaic solar cells (PV), small wind turbines (ten kilowatts or less), fuel cells, and solar-thermal electric systems. In an attempt to better understand the state of the market in California for these emerging renewable technologies, the Commission has instigated four important market research efforts, namely:

- Emerging Technologies Market Research Demand-Side Assessment (Work Authorization #5)
- Emerging Renewables Account Buy-down Program: Verification Protocol Development & Implementation for Renewable Energy Systems (Work Authorizations #7 and #21)
- Evaluation of Renewable Energy Program (Work Authorization #17)
- Market Research for Emerging Renewable Technologies: Consumer Education (Work Authorization #19)

The results of these efforts will enable the Energy Commission to develop and implement an effective consumer education program to promote the increased use of Emerging Renewable Technologies within California.

This brief report highlights some of the many key findings from these research efforts and includes information concerning California's 1) Current users of these technologies, 2) Residential and 3) Commercial sectors, and 4) Supply-side participants within the emerging renewable technologies market.

Current Users of Emerging Renewable Technologies

Overview

The Energy Commission sponsored several important efforts to better understand the current end-users of on-site renewable energy systems (Work Authorizations #5, #7, #21). In doing so, information was gathered concerning users' experiences, motivations, problems, and successes with the actual use of emerging renewable technologies. Information was also collected regarding experiences with the Commission's Emerging Renewables Buydown Program. The Buydown Program is a customer incentive program designed to reduce the up-front purchase and installation cost of emerging renewable technologies.

Current end-user research was conducted into three category groups: Residential Buydown Program participants (31), commercial Buydown Program participants (8), and non-Buydown/pre-Buydown Program participants (20). Verification efforts included a total of 68 systems currently in use and Buydown Program funded. The actual percentage of systems currently employed by these users were as follows:

- Residential Buydown Program participants: all solar PV systems
- Commercial Buydown Program participants: all solar PV systems
- Non/pre-Buydown Program participants: 42% solar PV; 34% solar PV and wind; 10% wind; 14% other (note: 60% of these systems are off grid)

Detailed below are the key findings of these efforts concerning current end-users.

End-User Motivations and Purchase Considerations

It is clear that the key motivators for current residential end-users were environmental concerns, to reduce utility bills, and a desire for backup power/improve the reliability of electricity supply. Several of these motivated homeowners already had either a solar water heating system, an earlier PV system, or a solar heated home. Commercial organizations currently using on-site electric generating systems cited their most important motivation was research and demonstration effects – this was particularly interesting as this was not one of the response choices offered in the survey question. Wanting to reduce utility bills and the need for backup power followed this main motivation.

In recouping the expense for purchasing and installing an on-site generation system, the acceptable 'payback' period averaged 12.6 years. Interestingly, the majority of current commercial users did not consider 'payback' in their decision, as they considered their systems demonstration projects.

Factors that influenced the decision to purchase an on-site generation system varied among users. Residents (both Buydown and non-Buydown participants) claimed dealers/suppliers, other current users, and magazine/newspaper articles most influenced their decision. Commercial users were most influenced by other current users and government agencies to consider this electricity generation option.

End-User Issues and Satisfaction

The majority of current users are satisfied with their on-site generation systems – indeed, 90% of system owners stated they would recommend their system to others that they know. This represents high satisfaction considering the significant level of investment (typically $5,000-$15,000 or more) that has been made by these owners.

Residential and commercial users reported various logistical problems in getting their systems in operation, including permitting issues, and the availability of information on financial and system benefits. Residents, in particular, cited billing and accounting issues with their local utility as being problematic. Current users not participating in the Buydown Program reported installation, system operation, and obtaining a subsidy as being problematic in the process of making their on-site systems operational.

Current users also referenced issues concerning interaction with building officials and officials' understanding of renewable energy systems. The majority of homeowners reported excellent relationships with their equipment suppliers, dealers and installers. Reactions to the Energy Commission's Buydown Program were almost all supportive with many stating it was the impetus that enabled them to purchase an on-site renewable energy system.

Residential Market Research

Overview

A review of market research information to date identified that a lack of data was available to assist in understanding California's residential market concerning emerging renewable energy technologies. Research efforts were undertaken by the Energy Commission to enable a better understanding of this important market sector and, in turn, to aid in developing an effective consumer education program.

These projects (Work Authorizations #5 and #19) assessed 2,640 California residents via the Internet and mail surveys to better understand the following:

- Awareness, understanding and interest in renewable energy sources
- Purchase considerations and motivations for a renewable energy generating system
- Perceptions and issues concerning renewable energy sources
- Communication/information sources, interests, and affiliations
- Demographics

Detailed below are the key findings of the research efforts for the residential sector.

Awareness, Understanding and Interest

More than half (57%) of residents are aware they can generate their own electric power with an on-site renewable resource and 42% are at least 'somewhat familiar' with one or more emerging renewable energy sources (namely solar photovoltaic (PV), small wind, fuel cells, solar-thermal electric systems).

Residents are most familiar with solar PV cells or small wind turbine systems with those claiming familiarity also citing they are knowledgeable as to *how* these sources actually generate electricity. Of those claiming to be 'very familiar' with solar PV cells, over one third were 35-44 years old and 83% were men.

More than one third (36%) of residents are aware of someone who is using an on-site renewable energy system with most claiming it was 'a friend.' Awareness was most high among residents aged 25-34 years. Again, of those who had ever received any information about renewable energy sources, 'a friend' mostly provided it, followed by a family member.

An impressive 90% of California residents (men and women equally) believe using renewable energy sources helps to improve the environment and 71% stated they would consider installing an emerging renewable technology source at their home sometime in the future.

Purchase Considerations and Motivations

California residents rank economic and financial considerations and environmental concerns as most important in the decision-making process for an on-site renewable generating system. At least half of all age groups believe economic considerations are a 'very important' part of the process. These prime considerations were followed by personal values for saving money and the availability of after-sales support. Overall, residents do not rank a 'personal interest in technology/up-to-date trends' as an important purchase consideration.

When considering installation and ownership features of an emerging renewable technology system, residents viewed 'equipment reliability' as the most significant. Equipment safety, maintenance costs, system longevity, and initial cost were also important. Residents, overall, were not interested in installing equipment themselves although current end-users of these technologies ranked this as an important feature. For all residents (current users and non-users) the ability to lease such a system was the least important feature.

Most residents are unsure what size renewable generating system would be preferred for their homes. When given an estimated price range (including a Buydown rebate) most residents (22%) opted for a medium-sized system to provide up to half of their electricity needs. Similarly, most current users (32%) of renewable energy systems selected a medium-sized system for their homes.

Perceptions and Issues

Almost 30% of residents do not believe that information about renewable energy systems was easy to find, access, or understand, with more than half claiming they 'did not know' or 'had not looked' for such information. Of those who believed information was easy to find, access, and understand, residents claimed this information mainly came from environmental organizations, green power marketing firms, or utility/energy providers. The majority of residents aware of companies producing or selling renewable energy products and services also believed the information provided by these companies to be both useful and easy to understand.

Awareness of the Energy Commission's Emerging Renewables Buydown Program among residents is 14% with a small percentage (4%) claiming to have seen promotional materials about the Buydown Program.

Just 3% of residents surveyed currently have a renewable energy system installed at their house. Of these current users, the majority (89%) have never been offered information following the purchase/installation of their systems, nor have manufacturers/suppliers/installers remained in contact with them.

Residents are considerably more likely to consider installing a solar PV system or another renewable energy system when adding/replacing their home's roof (60%), completing an extensive remodel (54%), or purchasing a new home (50%). Residents are unlikely, however, to use a home refinance package as an opportunity to install a renewable energy system.

Communication/Information Sources, Interests, and Affiliations

More than half of residents watch a major network television station and 50% read the local paper on a regular basis. More than one-quarter work primarily from a home office.

Although biased by the Internet survey component, an overwhelming 90% of residents claim they regularly use the Internet at home with 41% stating they use the Internet at their place of work. When asked what information source they rely on and refer to, the most – overall 41% – claimed television/radio stations followed by 39% citing the Internet/websites. Interestingly, of those who currently have a renewable energy system at home, half claim the Internet as their single most relied on source for information.

Most residents do not belong to any special interest groups, including environmental organizations. Residents do, however, contribute to environmental organizations either by way of donating money, goods, or volunteering their time (44%). Residents are interested in sports (30%), gardening/home improvement (16%), and arts & crafts/sewing (14%).

Demographics

Residential respondents demographic and general information were as follows (from Work Authorization #19 results):

- 60% were 35-44 years old
- 55% were women
- 25% earn between $50,000-$75,000 each year
- One third have some college education, 36% are 4-year college graduates or higher
- 36% represented two-person households
- One third estimated their home value at $100,000-$199,999
- 29% from Central Valley; 27% from North Coast; 24% from South Inland; 11% from South Coast; 9% from Desert/Mountain regions

Commercial Market Research

Overview

Market research information needs were identified for the commercial sector that would assist in better understanding the characteristics of decision makers and the emerging renewable technology market in relation to business. The Energy Commission gathered information on California's commercial sector via two research projects (Work Authorizations #5 and #19). Using both Internet and mail survey methods, 1,029 commercial organizations were surveyed to better understand the following:

- Awareness, understanding and interest in renewable energy sources
- Perceptions and issues concerning renewable energy sources
- General organizational/demographic information

Detailed below are the key findings of these efforts concerning the commercial market.

Awareness, Understanding, and Interest

Forty percent of businesses are aware they can generate electricity at their business using a renewable energy source (solar PV cells, small wind turbines, fuel cells, or solar-thermal electric systems) and remain connected to the utility grid.

Most commercial organizations (65%) are at least 'somewhat familiar' with one of the four emerging renewable technologies, with respondents claiming most familiarity with solar PV cells and small wind turbine systems. Interestingly, commercial sector respondents view themselves as more familiar with the *way* in which these technologies (solar PV and small wind) actually generate electricity than with the technologies overall.

The manufacturing segment appears more aware of PV and wind technologies than the sample overall. Those respondents familiar with PV also showed higher familiarity with other emerging renewable technologies.

A high number, 87%, of commercial respondents believe using renewable energy sources helps to improve the environment.

Almost 40% are aware of someone who has installed a renewable energy system with 18% of those claiming it to be 'a friend' and 8% citing 'another business.'

Commercial organizations claim a range of purchase considerations to be important in the decision making process for renewable energy systems. Almost one half believe economic and financial to be the most important considerations, followed by available system support/maintenance services, and personal values for saving money. Although this survey was conducted prior to recent energy issues experienced in California (i.e. energy shortages and reliability concerns), complete independence from the electric utility was not deemed as a high consideration. Interestingly, 53% of office business types ranked a 'personal interest in technology and up-to-date trends' as important even though this was ranked the lowest overall consideration.

Acceptable 'payback' periods for the commercial sector are spread quite evenly between 1 to 10 years with 46% finding 5 to 10 years as an acceptable period to recoup purchase and installation costs of an on-site renewable generation system. Almost one-third of commercial respondents opted for a medium-sized system that would provide up to 25% of their electricity needs, with another 28% unsure of a suitable system size.

Considering ownership and installation features of a renewable energy system, equipment reliability ranked the highest in importance followed by intial system cost, system longevity, maintenance costs, and the availability of finance.

Almost half of commercial respondents stated they would consider installing an emerging renewable technology system at their business sometime in the future with 26% stating they would not. Of 'office type' business respondents, 35% stated that they would not consider installation of an on-site generation system.

Perceptions and Issues

The majority of commercial respondents either believed information about renewable energy systems (for home or business applications) was not easy to find, access, and understand, or they had simply never looked for such information (44% and 43% respectively). Of the 13%

that had found information accessible, most had received it from a green power-marketing firm.

Business respondents would mostly refer to an existing system owner for advice or information about an emerging renewable system for on-site generation. Other contacts would be electric utilities, energy service providers, manufacturers, or consumer protection groups. Interestingly, although renewable energy information was mostly received from green power-marketing firms (see above), this was the least popular source of advice and information, along with environmental groups.

An exceptionally high number of commercial respondents (96%) were not aware of utility net metering requirements. Awareness is low (4%) of the Energy Commission's Emerging Renewables Buydown Program. Similarly, 84% are not aware of any company that produces/sells renewable energy products or services.

Commercial operations are more likely to consider installing a solar PV system (or another type of renewable energy system) while completing an extensive remodel of their business (60%), adding/replacing a roof (57%), or when purchasing a new business (50%). They are less likely to consider this installation as part of a business refinance package.

General Organizational/Demographic Information

General organizational information about commercial respondents were as follows (from Work Authorization #19 results):

- 70% of commercial business respondents had 5 or fewer employees
- Two thirds have facilities that are 5,000 square feet or less with the majority (36%) estimating an electricity bill of $100-$499 per month
- 83% of businesses do not follow set procurement or purchasing procedures
- Over 33% of businesses are members of a professional/trade organization
- 58% use the Internet regularly at work
- 46% were classified as 'management'
- 61% South Inland businesses; 24% South Coast; 8% North Coast; 4% Central Valley; 3% Desert/Mountain

Supplier Side Market Research

Overview

As part of the evaluation of the Emerging Renewable Energy Demand-Side Assessment (Work Authorization #5), the Energy Commission supported research efforts into the supply-side of the market. This effort represents a telephone survey of 23 system retailers/installers and eight system manufacturers operating in California; the key findings for the supplier-side of the market are detailed below.

General Characteristics

- Retailer/installer firms have been in business in California an average of 17 years with an average of 7 employees in California sites.
- In general, all manufacturers have either recently expanded facilities or have plans to do so in the near future.
- Most retailers/installers sell their renewable energy systems outright with one third delivering systems on a leased or financed basis. All manufacturers reported their units sold were paid for in full, with no systems sold on a lease or finance arrangement.
- Seventy-three percent of retailers/installers and 63% of manufacturers reported affiliation with the California Solar Energy Industry Association.
- Sixty-three percent of both retailers/installers and manufacturers read "Home Power," 58% of retailers/installers read "Solar Today," and 50% of manufacturers read "Remote Power" trade publications.

Issues

Interconnection requirements and utility/building inspections were highlighted as being problematic. Respondents noted that some inspectors showed a lack of general understanding of systems and often-poor customer service. Training for utility inspectors/building officials was suggested by many respondents as a possible solution.

Two thirds of retailers/installers stated they would like more marketing support (e.g. promotional and customer education material, toll-free helpline number, etc.) from manufacturers, although technical support was presented as adequate.

Marketing Efforts

The emerging renewable technology market was described as 'immature' by most respondents with many citing they have not attempted to identify promising market segments.

Of those retailers/installers and manufacturer firms that had considered marketing planning, their observations included:

- Target markets for retailer/installer sector focused on residential markets (89%), small commercial premises (84%), and institutions/governments (53%).
- Manufacturers often rely on their dealer network for marketing efforts with several respondents stating they did not have a systematic method for target market identification.
- The market 'saturation' for the residential sector was roughly estimated at 4%, and 2% for the commercial sector.
- Most respondents use the Internet in varying degrees to promote their systems and services.
- All manufacturers reported some magazine advertising, with no radio or television advertising.
- Retailers/installers relied on a magazine and direct mail advertising presence (after Internet).

Consumer education, awareness and promotion of renewable energy options were the prime market assistance tools identified as needed by respondents.

The majority of respondents cited environmental stewardship as the prime customer motivation for renewable system purchases; wind manufacturers, however, stated cost savings and backup to solar PV systems as the main motivators.

Energy Commission's Renewable Energy Program

- Eighty-nine percent of retailers/installers and 100% of manufacturers are aware of the Energy Commission's Emerging Renewables Buydown Program with all reporting to be satisfied with the Commission's handling of Buydown requests – a few respondents (particularly wind manufacturers), however, reported experiencing slowness of payment.
- Most respondents feel the Buydown Program has been effective in creating a market for on-site renewable technologies.
- Awareness appears high concerning the net metering concept with some awareness of the Energy Commission's production of a Net Metering Fact Sheet.
- There is an overall willingness among retailers/installers and manufacturers to consider participating in marketing activities with the Energy Commission.